The Effect of Commercial Horse Feeds versus Home Mixed Feed Grains on Foal Growth

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Spring 2007

Abstract

Most horse owners prefer to buy commercially prepared feeds because they are more convenient and the nutrient levels are usually balanced. Commercial prepared feeds usually are marketed at higher cost for these reasons. Home mixed feed grains take more time to prepare but usually cost less.

The objectives of this study were to evaluate any difference in foal growth. To determine if feeding home mixed grains, costing 30 – 50 % less, would meet the growing foal's needs as well as the commercial prepared feeds and to determine which type of concentrate produces the most efficient growth for the least cost.

There were six foals used during the study, located at the Ohio State University Equine Center. The first group was fed a commercial creep feed, Omolene 300, produced by Purina Mills. The second group was fed a home mixed ration consisting of: whole shelled corn, soybean oil meal, calcium, phosphorous, salt and trace minerals. The foals were weighed with the use of a scale. Body measurements were taken for: knee, hock, hip and wither height from the ground and a measurement of body length.

The results show that there is really no significant difference in foal growth between the two groups. The growth curve comparing weight and wither height show no significant differences. However, due to a small sample size the results prove insignificant. As a suggestion for future research, the use of more foals would be beneficial.

Objectives

The primary goal of this project is to evaluate any difference in foal growth between commercial prepared feeds and home mixed feed rations. The project will also determine if home mixed feed grains, costing 30-50% less will meet the growing foal=s needs as well as the commercial prepared feeds. Lastly, the type of concentrate that produces the most efficient growth for the least cost will be determined.

Introduction

There have been several methods used to develop feed rations in horses. A majority of the methods are based on trial and error, making substitutions until all factors in the ration are known and balanced (Kline et al., 2000). Rations developed by respectable feed manufacturers are usually very good. Most horse owners prefer to buy commercial mixed grains because they are more convenient. The advantage of commercial grains is that the nutrient levels do not always have to be checked and nutrient needs are usually met (Kline et al., 2000). Commercial mixed grains tend to be more costly because they are specifically formulated.

A disadvantage to home mixed rations is that they take more time to prepare. The protein, energy and minerals have to be added in the correct amounts or deficiencies in the horse could result. The most expensive nutrient in a home mixed ration is the protein (Kline et al., 2000).

The cost of commercial feeds is very high compared to using home mixed feed grains. The question is can home mixed feed grains, costing 30-50% less, meet the growing foal=s needs as well as the commercial prepared feeds. The goal is to determine if buying commercial grains is worth the expense in terms of producing the most efficient growth. Horse owners should know whether or not home mixed grains are as good as commercial grains and if they are, then owners could save money on feed.

Literature Review

Foals will usually begin to nibble hay and concentrates at roughly 10-21 days old (Frape, 2004). It is possible that what the foal consumes from its mother=s feed could result in an imbalanced diet. For this reason, many horse owners provide foals access to a creep feed. A creep is an enclosed area where only the foal can enter and the mare likes to loaf. Another very important reason why concentrates are offered to foals before weaning is to increase the anatomical and physiological development of the GI tract (Frape, 2004). This is to prevent any stress on the digestive tract caused by abnormal fermentation when the foal is weaned.

At 5-6 weeks of age, foals will usually consume at least 0.5 pounds of creep feed per 100 pounds of body weight (Cunha, 1991). The amount of grain consumed will gradually increase to as much as 10 pounds per day by the time of weaning. The amount of grain consumed will ultimately depend on the mother=s milking ability, type of creep feed and the desired growth rate of the foal.

At birth, the foal will be approximately 8-10% of the mare=s weight (Cunha, 1991). On average, the colt will be heavier than the filly. As a newborn, the foal=s wither height will be about 60% of its mature height (Breuer, 1974). The foal=s hoofs, pasterns and cannon bones will be about 75-80% of the adult length. The bones of the neck, back, croup, pelvis and shoulder will be approximately 35-55% of mature length

The average daily gain during the first month of life is about 4 lb per day (Breuer, 1974). This leads to the body weight doubling in the first month. The daily gain begins to slowly decrease and by three months is about 3.15 lb per day (Breuer, 1974). The weight at three months of age is approximately half way between the weights from birth

to six months of age (Willoughby, 1975). Between seven and eighteen months of age, the daily gain decreases to about 1.21 lb per day (Breuer, 1974).

The amount of protein needed in the equine diet varies according to age and use. Foals nursing and consuming creep feed need at least 18% protein in the diet. Weanlings need at least 16% protein in the diet. There are ten amino acids that must be supplied to the horse: arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine (Kline et al., 2000). Lysine is often the most lacking in growing horse rations (Kline et al., 2000). Soybean oil meal is high in lysine and is usually cheaper than other protein sources, so it is commonly used in horse grains.

Corn is a common concentrate fed to horses because of its low cost and high value of energy (Kline et al., 2000). Corn contains approximately double the amount of energy as an equal volume of oats contain. The amount of protein is about 10%, but it is of low quality protein (Kline et al., 2000).

The calcium to phosphorous ratio in growing foals rations is very important. The ideal ratio for foals is 1.6:1 Ca:P and they can not tolerate a ration above is 3:1 Ca:P (Kline et al., 2000). Trace minerals are also very important in the diet. Ohio tends to be low in iodine and selenium and at times deficient in copper and zinc (Kline et al., 2000). Grains grown in Ohio need to be supplemented with these minerals. Salt is another important addition to the diet. Salt should be added in the concentrate and free choice in the form of a block or loose form. Trace mineralized salt designed for horses is the common way to supply the trace minerals.

Procedure and Methods

1.) The horses that were utilized are located at The Ohio State University Horse Center. There were six Quarter Horse or stock type foals born between March and June of 2006.

   a. All of the mares were fed the same type of alfalfa hay and whole shelled corn.

   b. When the foals were born, the mares and foals were separated into two different groups in an alternating order by date of birth. This was to even out differences in growth due to the time of year foaled.

   c. The first group was fed a commercial creep feed called Omolene 300 produced by Purina Mills. The percent protein is not less than 16%.

   d. The second group was fed a home mixed ration consisting of: whole shelled corn, soybean oil meal, calcium, phosphorus, salt and trace minerals.

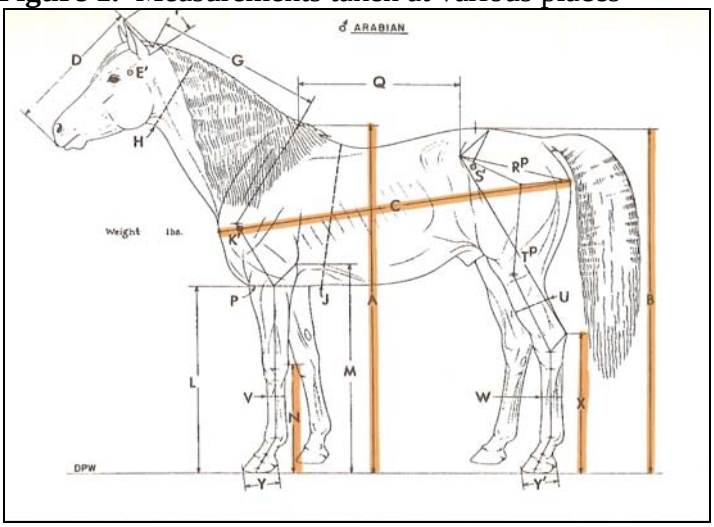
2.) The amount of concentrate fed depended on the ages and weights of the group. The mares and foals were fed twice a day. Concentrate was not fed free choice to the foals, this was to lessen the chance of rapid growth abnormalities due to overeating. The amount required per day was fed half in the morning and half at the evening meal. Any grain not eaten was removed, weighed and recorded to determine the amount consumed during the study. The amount of grain fed was readjusted as needed on a biweekly basis, according to weight.

a. Foals usually do not consume much concentrate during the first month. The foals were only fed 0.25% of their body weight daily.

b. As the weight of the foals increased, the amount of concentrate fed increased at a gradual rate from 0.5% to 0.75% and eventually 1% of the body weight daily.

3.) The foals were weighed with the use of a scale. The foals were then measured by taking knee (N), hock (X), withers (A), and hip height (B) from the ground, see Figure 1. A measure of the body length (C) was also taken from the point of shoulder (head of humerus) to the point of buttocks (tuber ischii).

Figure 1. Measurements taken at various places



Courtesy of Willoughby 1975

a. The newborn foals were weighed and measured to determine the starting weight and size by forty eight hours of age.

b. The foals were routinely weighed and measured post-weaning until three months of age.

4) A T-test was used to find any difference in weight and size between the two groups.

Results

Table 1. Weight in pounds for the commercial creep feed foals. Measurements were taken at birth, four weeks and every two weeks after until twelve weeks of age.

Age (weeks)	Foal A	Foal B	Foal C
0	127	122	125
4	191	242	210
6	244.5	283	242
8	285.5	321	260
10	329.5	356	290
12	371	394	327

Figure 2. Foal Weights When Consuming Commercial Feed

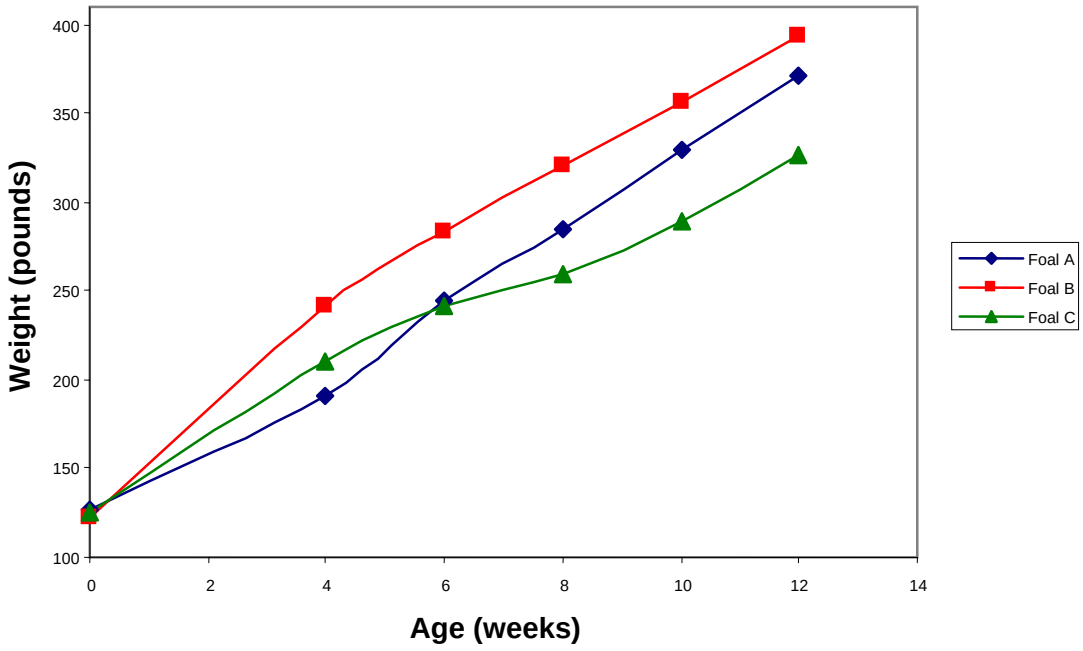


Table 2. Weight in pounds for the home mixed creep feed foals. Measurements were taken at birth, four weeks and every two weeks after until twelve weeks of age.

Age (weeks)	Foal E	Foal F	Foal G
0	102	131	119
4	191	222	219
6	263	266	264
8	300	295	306
10	334	332	340
12	364	364	381

Figure 3. Foal Weights When Consuming Home Mixed Feed

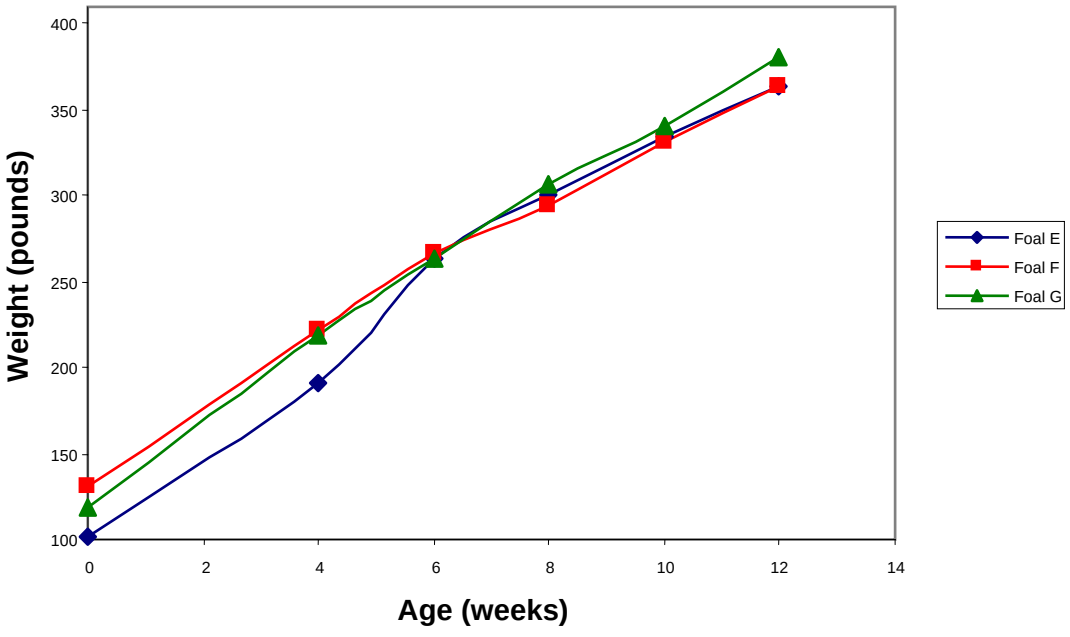


Table 3. Height at the withers measured in inches for the commercial creep feed foals. Measurements were taken at birth, four weeks and every two weeks after until twelve weeks of age.

Age (weeks)	Foal A	Foal B	Foal C
0	40	39	38.25
4	40.5	42	41
6	43	43.25	42
8	43.5	44.5	43
10	43.75	46	43
12	44.5	47	45

Figure 4. Foal Heights When Consuming Commercial Feed

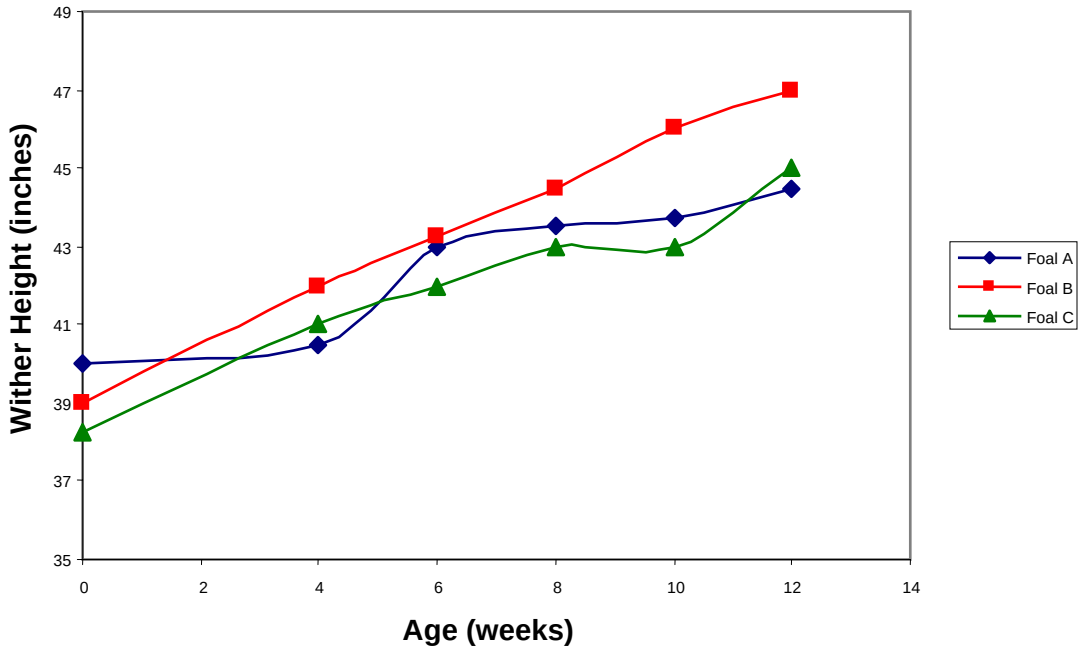


Table 4. Height at the withers measured in inches for the home mixed creep feed foals. Measurements were taken at birth, four weeks and every two weeks after until twelve weeks of age.

Age (weeks)	Foal E	Foal F	Foal G
0	37	41	38
4	41.5	43.5	42
6	43.25	45.75	43.5
8	45	46.5	44.5
10	46	47.5	45
12	46.5	48	46

Figure 5. Foal Heights When Consuming Home Mixed Feed

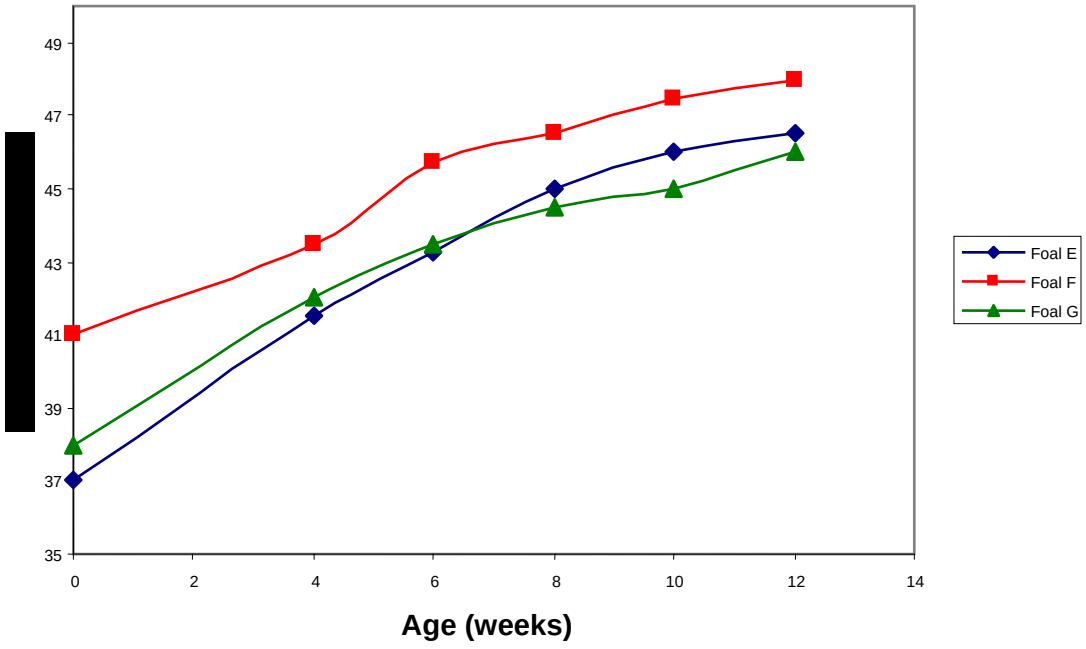


Figure 6. Average Change in Body Measurements From Birth to Three Months

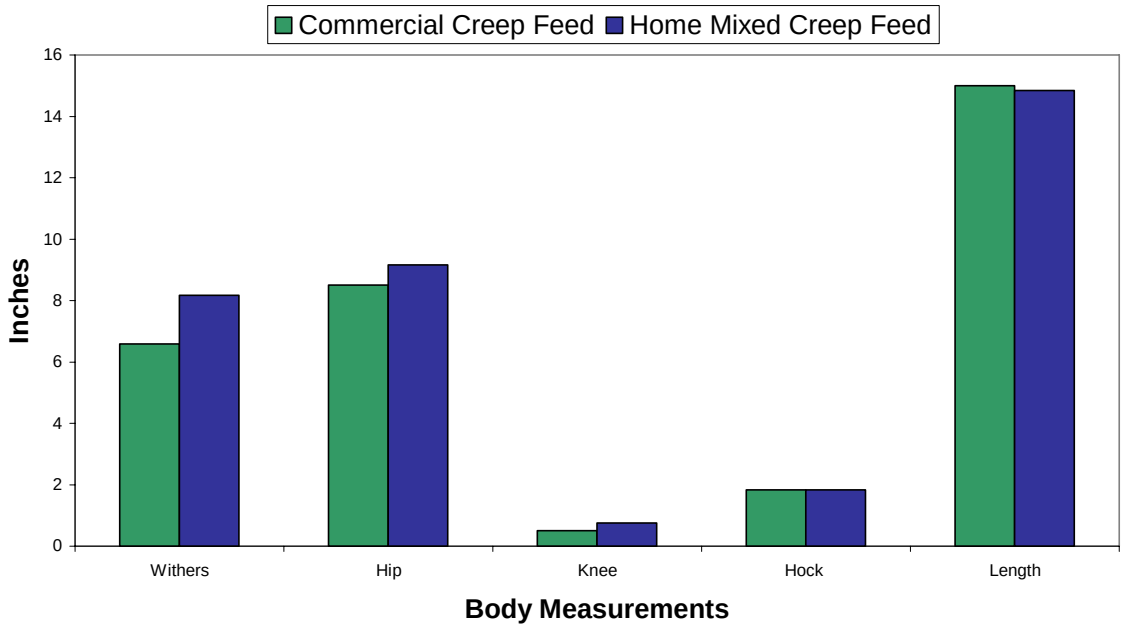


Figure 7. Average Change in Weight From Birth to Three Months

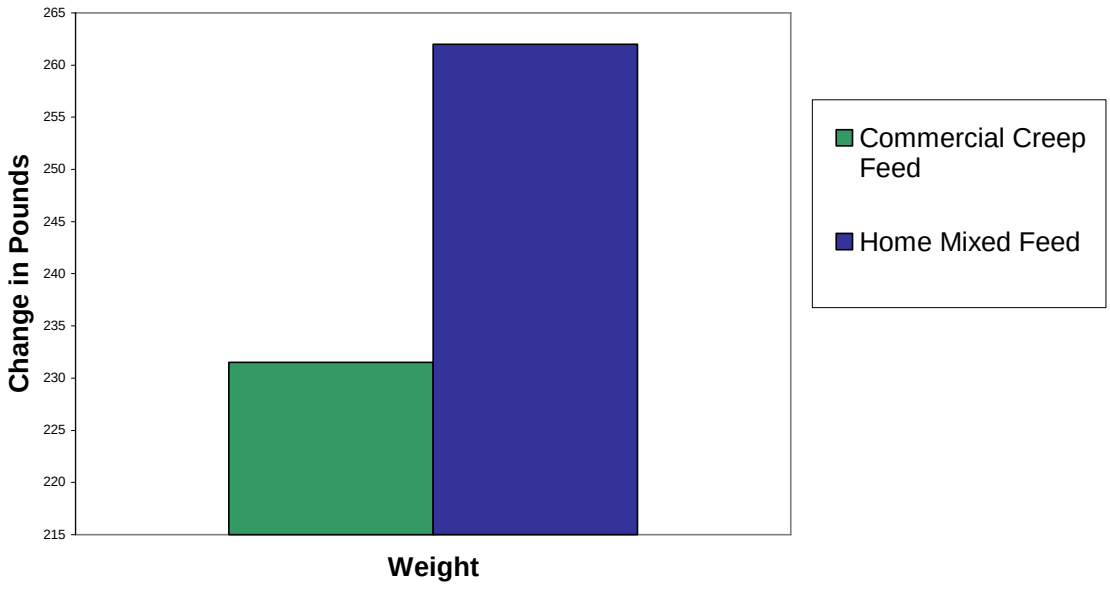


Table 5. Feed Analysis of the Home Mixed Feed

% Moisture	8.24
% Ash	11.31
% Fat	7.62
% Acid Detergent Fiber	4.2
% Protein	19.9

Discussion

The overall results of this experiment show that there is no difference between foal weights and heights. However, we can not conclude that there is truly no difference because of the small sample size.

Even though the difference in weights may appear to be significant the T – test value is 0.73. At a p – value of 0.05, the T – test value would have to be larger than 2.1 to be significant. None of the values for any measurement are larger than 0.94. Seeing that the values are not close to the significance value, one can conclude that there is no significant difference or even a trend between foal weight and heights.

When the feed analyses are compared the home mixed feed contained a slightly higher level of protein and fat. The home mixed feed contained 19.9% protein compared to not less than 16% protein in the commercial feed. The fat content was slightly higher in the home mixed at 7.62% compared to 4.5% in the commercial feed.

When the growth results are compared to reported foal growth values, the results are similar but show slight differences. Wither height is compared to values from Cunningham and Fowler (1961) reported in Willoughby (1975) on Quarter Horse foals. The foals at birth are reported to stand an average 35.80 inches. The foals in the study from the commercial feed group and home mixed feed group stood an average of 39.08 and 38.67 inches, respectively. At three months of age, reported foals stood an average of 44.25 inches, while the foals in the study stood an average of 45.5 and 46.8 inches, respectively.

The increase in height at the withers in Thoroughbred foals is reported in Frape, 2004. From birth to three months, an average increase of 7.4 inches was achieved. As

seen in Figure 6, the average increase in withers height from birth to three months in the commercially fed group was 6.58 inches. The home mixed fed group increased 8.2 inches in withers height from birth.

For light horses with an adult weight ranging between 1134 – 1309 pounds, the optimum birth weight of the foal ranges between 110 – 125 pounds (Willoughby, 1975). This data coincides with the average weight of the foals in the study. The average birth weight of the commercially fed foals was 124.67 pounds while the average birth weight of the home mixed fed foals was 117.33.

There were several challenges that make the results unreliable. In the original study, nine to ten foals were expected. Two of the foals were lost shortly after birth and a third foal was lost at a few weeks old due to septicemia. Foal D was eliminated from the project because of an incomplete data set due to surgery. Foal A was sick shortly after birth and as a result shows an erratic growth pattern, specifically in Figure 3.

The foals were separated by alternating date of birth to even out any differences in growth due to the time of year foaled. Frape (2004) has reported a difference in weight and height due to the month of year foaled. Foals born in February or March weighed 210 pounds at 30 days of age. This is compared to foals born in May weighing 222 pounds at 30 days of age. There is a small difference in height. Foals born in February or March stood 42.99 inches at 30 days compared to 43.74 inches for the May foals. The two colts in the current study were born in alteration so they both were in the home mixed feed group.

It is reported in Frape (2004) that there is a slight difference in initial and ultimate weights and heights between colts and fillies. When recorded on Thoroughbred foals, the

colts generally stood a little heavier and taller, at 115 pounds and 39.5 inches at birth. The fillies stood at 113 pounds and 39.25 inches.

The original study intended to record data until the foals were approximately six months of age. One of the colts was sold at three months of age leaving only two foals in the home mixed feed group. As a result of this, data were only compiled from foals up to three months of age.

Lastly, the average daily consumption was not an accurate value because the foals were moved around so much. Therefore, the concentrate that produced the most efficient growth for the least cost was not included in the data because of inaccuracy.

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